

WHAT IS CLAIMED IS:

1. A magnetic memory cell, comprising:
 - a data layer;
 - a soft reference layer having a lower magnetic energy than said data layer; and
 - a spacer layer between said data layer and said reference layer.
2. The magnetic memory cell of claim 1, wherein said soft reference layer has a smaller anisotropy than said data layer.
3. The magnetic memory cell of claim 2, wherein said smaller anisotropy includes a smaller shape anisotropy.
4. The magnetic memory cell of claim 1, wherein a ratio of magnetic energy to thermal energy of said soft reference layer is less than 50.
5. The magnetic memory cell of claim 1, wherein said soft reference layer is superparamagnetic.
6. The magnetic memory cell of claim 1, wherein said soft reference layer substantially forms a shape having a low aspect ratio.
7. The magnetic memory cell of claim 1, wherein said soft reference layer substantially forms a circle.
8. The magnetic memory cell of claim 1, wherein said soft reference layer comprises a plurality of dots, each of which is smaller than said data layer.
9. The magnetic memory cell of claim 1, wherein said soft reference layer has a smaller volume than said data layer.

10. The magnetic memory cell of claim 1, wherein said soft reference layer has a smaller planar area than said data layer.
11. The magnetic memory cell of claim 1, wherein said soft reference layer is thinner than said data layer.
12. The magnetic memory cell of claim 1, wherein said soft reference layer is laterally narrower than said data layer.
13. The magnetic memory cell of claim 1, wherein said soft reference layer is more thermally unstable than said data layer.
14. The magnetic memory cell of claim 1, wherein said data layer comprises more than one layer of materials.
15. The magnetic memory cell of claim 1, wherein said data layer is proximate a ferromagnetic material that is configured to act as a flux guide for magnetic fields emanating from said data layer.
16. The magnetic memory cell of claim 15, wherein said ferromagnetic material is a cladding around a conductor.
17. A method for making magnetic memory cell having a soft reference layer, comprising:
 - forming a data layer;
 - forming a soft reference layer having a lower magnetic energy than said data layer; and
 - forming a spacer layer between said data layer and said soft reference layer.
18. The method of claim 17, wherein said forming a soft reference layer comprises forming a layer having a smaller anisotropy than said data layer.

19. The method of claim 18, wherein said smaller anisotropy includes a smaller shape anisotropy.
20. The method of claim 19, wherein said forming a soft reference layer comprises patterning said soft reference layer to substantially form a shape having a low aspect ratio.
21. The method of claim 19, wherein said forming a soft reference layer comprises patterning said soft reference layer to substantially form a circle.
22. The method of claim 19, wherein said forming a soft reference layer comprises forming a plurality of dots, each of which is smaller than said data layer.
23. The method of claim 17, wherein said forming a soft reference layer comprises forming a soft reference layer having a smaller volume than said data layer.
24. The method of claim 17, wherein said forming a soft reference layer comprises forming a soft reference layer having a smaller planar area than said data layer.
25. The method of claim 17, wherein said forming a soft reference layer comprises forming a laterally narrower soft reference layer than said data layer.
26. The method of claim 17, wherein said forming a data layer comprises forming more than one layer of materials.
27. The method of claim 17, wherein said forming a data layer comprises forming a data layer near a ferromagnetic material that is configured to act as a flux guide for magnetic fields emanating from said data layer.

28. The magnetic memory cell of claim 27, wherein said ferromagnetic material is a cladding around a conductor.

29. A nonvolatile memory array comprising a plurality of magnetic memory cells, each of said magnetic memory cells being made by a process comprising:

- forming a data layer;
- forming a soft reference layer having a lower magnetic energy than said data layer; and
- forming a spacer layer between said data layer and said soft reference layer.